

Section 3 Asset Class - Bicycle and Pedestrian System:

The Bicycle and Pedestrian System asset class is the set of SDOT assets that serve pedestrians and bicyclists and encourage walking and bicycling for transportation and recreation. It includes the following assets:

- ✓ Bicycle Racks
- ✓ Marked Crosswalks
- ✓ Pedestrian Crossing Underpass/Tunnel
- ✓ Pedestrian Viewing Platforms
- ✓ Sidewalks
- ✓ Stairways
- ✓ Trails
- ✓ Transit Loading Platforms

These assets have ownership responsibilities distributed across multiple divisions. For some of these assets, budgeting is performed and tracked through a general maintenance budget that may include assets from other classes.

Bicycle Racks:

Bicycle parking supports the use of bicycles by establishing a place to secure bicycles near destinations. Providing an adequate supply of convenient bicycle parking is an important tool to increase cycling.

Bicycle parking is installed and maintained by Traffic Maintenance crews at the direction of the Traffic Operations group in the Traffic Management Division.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:



**Bicycle Rack Converted
from a Meter Pole**

In the summer of 2009, the Traffic Operations group conducted a field inventory of bicycle racks. The field work focused on known locations of racks, as well as major arterials throughout the city. A total of 2,500 racks were inventoried and their condition rated. This information was entered into the Department's asset data repository. The effort also created GIS maps of existing assets that will be useful to site new assets.

Bicycle Rack Condition Rating 2009

% in Good Condition	% in Fair Condition	% in Poor Condition
97%	1.7	> 1%

Approximately 350 new bicycle parking spaces will be installed in 2010. We have changed to unit of measure from racks to spaces to reflect the variety of bicycle parking solutions available, including on-street bicycle parking for multiple bicycles and racks that re-use parking meter poles as their base.

The estimated replacement value for bicycle racks is \$1,815,000.

Useful Life and Life Cycle Costs:

Several different types of bicycle racks have been installed in the city of Seattle. On average, when installed as new, a bicycle rack can be expected to have a useful life of twenty (20) years, based on vendor design specifications. The cost of acquisition and installation can vary from \$380 to \$950. Routine maintenance of a bicycle rack requires one (1) bolt-reset over the twenty (20) years which will cost approximately \$330.

Maintenance Approach:

Maintenance of bicycle racks is undertaken in response to customer requests.

Current Performance Measures:

The 2007 Bicycle Master Plan has established the goal:

- ✓ Install 3,000 new bicycle racks between 2007 and 2017. (This performance measure is being implemented as 6,000 spaces.)

Approximately 350 new bicycle parking spaces will be installed in 2010.

Funding Requirements and Unmet Funding Needs:

In 2009, approximately \$50,000 was spent on maintenance, replacement, and installation of 150 new bicycle racks. For 2010, Traffic Operations has allocated \$110,000 for the installation of 350 new bicycle parking spaces.

Marked Crosswalks:



All intersections have crosswalks unless otherwise posted. At some locations, the crosswalks are marked with paint or other methods to establish a visible demarcation.

There are four (4) types of marked crosswalks:

- ✓ Raised – which includes a paved platform in addition to the striping
- ✓ Painted
- ✓ Torch-down – a type of crosswalk marking where the material is integrated into the pavement through the application of intense heat provided by a torch
- ✓ Thermoplastic – a type of crosswalk marking where a plastic amalgam is applied to the pavement.



**Thermoplastic Crosswalk
(StreetPrint DuraTherm)**

Marked crosswalks are maintained by Traffic Maintenance crews at the direction of the Traffic Operations group in the Traffic Management Division. The Street Maintenance Division maintains the pavement component of the raised crosswalks at the direction of the Traffic Operations group.

Current Inventory and Condition Ratings:

The department completed a field inventory of marked crosswalks during 2008, and in 2009 the data was recorded in the asset data repository. The inventory recorded a total of 4,994 marked crosswalks and also noted the condition as

Marked Crosswalk Condition Rating 2008

% in Good Condition	% in Fair Condition	% in Poor Condition
77%	11%	11%

The estimated replacement value for marked crosswalks is \$2.7 million in current dollars.

Useful Life and Life Cycle Costs:

Thermoplastic and torch-down crosswalks are expected to have a useful life of seven (7) years when newly installed, and cost approximately \$500 to install. The expected useful life for a raised crosswalk is forty (40) years, and will cost approximately \$50,000 to install. Painted crosswalks are not expected to last more than two (2) years.

Maintenance costs have been included in a general maintenance budget, and specific costs for maintenance of marked crosswalks are not available.

Maintenance Approach:

Prior to BTG funding, maintenance was undertaken in response to a customer request, or maintenance crew observation. Using BTG funding, SDOT will develop a maintenance program for remarking crosswalks on a regular maintenance cycle. Remarkings through 2010 has so far reached more than half the inventory



Raised Crosswalk

Current Performance Measures:

BTG funding has established the following performance measures for marked crosswalks:

Performance Measure	2009 Actual	2010 Goal
Remarkd crosswalks	810	600

The TSP established the following performance measure for marked crosswalks in 2005:

- ✓ Increase the number of crosswalks at uncontrolled locations that meet federal guidelines and city policy from 93% in 2005 to 100% in 2010.

All marked crosswalks now meet federal guidelines and city policy.

Funding Requirements and Unmet Funding Needs:

Prior to 2007, Traffic Operations had base funding of approximately \$261,000 for remarking of crosswalks to address customer requests. BTG established an additional \$230,000 for a total of \$491,000 base funding in 2007 which was considered adequate to meet the BTG targets and ensure replacement of each marked crosswalk by the end of its useful life. Funding requirements for maintenance of the concrete platform for raised crosswalks are included in a general maintenance budget and are not separable at the asset level.

Pedestrian Crossing Underpass/Tunnel:

A pedestrian crossing underpass/tunnel provides an underground means for pedestrians and bicycles to cross a busy arterial. There is only one (1) pedestrian crossing underpass/tunnel in the city of Seattle, and it is located under Aurora Avenue at N 79th and Aurora. The tunnel was built in 1929 and is currently closed for public safety reasons.

The records for the pedestrian crossing underpass/tunnel are maintained by the Roadway Structures group in the Capital Projects and Roadway Structures Division.

Pedestrian Viewing Platforms:

A pedestrian viewing platform is a structural deck that provides space for pedestrians to view the city and its surroundings away from vehicular traffic. There are four (4) pedestrian viewing platforms in Seattle under the jurisdiction of SDOT

- ✓ :9300 block of California Place SW
- ✓ 700 block of Galer St
- ✓ 2500 block of Westlake Ave N
- ✓ NE 130th St and Riviera Place NE

The inventory and location of these platforms is maintained in the Structures database.

The pedestrian viewing platforms are maintained by the Roadway Structures group in the Capital Projects and Roadway Structures Division.

Additional information about the pedestrian viewing platforms was not pursued for this reporting period.

Sidewalk System:



The sidewalk system consists of paved walkways (concrete, asphalt, and pavers), a few soft-surface pathways, curbs, filler areas, and curb ramps. Curbs, if present, separate the pedestrian area from the

street and also provide a drainage function. The filler area is adjacent to the sidewalk, may be improved or unimproved, and is the zone occupied by the street shoulder, planting strip, trees, light poles, parking meters or pay stations, and other street furniture. Curb ramps provide access to the



Sidewalk in a Commercial District

sidewalk system at street crossings and are usually located at intersections. There are some sidewalks in the existing sidewalk system that do not have curb ramps, and without a curb ramp, the sidewalk is not considered fully accessible.

Adjacent property owners are responsible for maintaining sidewalks, which includes shoveling snow, raking leaves, and repairing sidewalk damage when it is privately caused, e.g., by uplift from trees, failed side sewer connection, construction, or parking damage.

SDOT is responsible for repairing damaged sidewalk at intersections and also damage caused by trees or

other conditions in the ROW. Curb repairs are the responsibility of the city except in those instances where the curb is constructed monolithically with the sidewalk and the damaged sidewalk is a private responsibility.

The city's responsibility for the sidewalk system is shared between the Traffic Operations group in the Traffic Management Division, which plans, designs and builds new sidewalks, and the Street Maintenance Division, which is responsible for maintenance of the sidewalk system.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

SDOT completed a physical inventory of the sidewalk system in October 2007. At that time, the length of Seattle's sidewalk system was 2,256 miles, or 67.5 million square feet of sidewalk. The sidewalk system also includes:

- ✓ 2,274 miles of cast concrete and stone curbs. Extruded curbs and thickened edges are excluded in this figure.
- ✓ 2,033 miles, or 74.8 million square feet of filler. Of this total, 351 miles, or 8.93 million square feet, is partially or completely paved.
- ✓ 27,712 curb ramps at the end of blocks.

The physical inventory of the sidewalk system is maintained in the Hansen system. In 2008, the department conducted a partial condition survey of sidewalks in several locations throughout the city, focusing on areas of known higher pedestrian volume such as the Urban Villages. Condition information was based on observable signs of distress or uplifts in the sidewalk surfaces. BTG has provided the funding to build 12-20 new block faces of sidewalk per year between 2007 and 2016. Each year additional sidewalks are also built under Street Use permits or as part of SDOT capital projects. Approximately 265 curb ramps will be installed or upgraded in 2010.

The estimated replacement value of the existing sidewalk system is \$2.8 billion in current dollars.

Useful Life and Life Cycle Costs:

When newly constructed, a sidewalk has an expected useful life of fifty (50) years. The cost of new sidewalk is approximately \$185,000 per block face (one side of one average block). This cost does not include ROW acquisition, substantial excavation, or retaining wall construction. It also assumes minimal drainage costs. Any one of these factors can substantially increase the cost of new sidewalk. Routine maintenance consists of placing asphalt shims between sidewalk sections or grinding to achieve a more level walking surface. Up to \$100,000 per year has been spent on this type of routine maintenance for all SDOT sidewalks.

Sidewalks that are rated in fair condition have a remaining life expectancy of ten (10) years. As deterioration continues, the area of sidewalk that needs repair increases. When a sidewalk degrades to poor condition, it requires complete replacement. The cost to rehabilitate or replace the sidewalk is approximately \$30 per square foot, $\pm 20\%$

Maintenance Approach:

SDOT currently provides two (2) basic types of maintenance for its sidewalks:

- ✓ Spot repair
- ✓ Permanent repair

Spot repair typically involves a site visit where maintenance staff may paint defects with white paint, place a barricade, and/or initiate a spot repair. SDOT “Pothole Ranger” crews make the spot repairs, usually by applying an asphalt patch to correct faults, settlement or other distress. If the defect cannot be corrected with a spot repair, the sidewalk may be closed or evaluated as a candidate for permanent repair.

Permanent repairs are intended to extend the useful life of the sidewalk surface by 20-40 years, although sidewalks adjacent to street trees may require much more frequent maintenance.

Repairs are triggered in three primary ways:

- ✓ Customer Request
- ✓ Claims
- ✓ Field observations

SDOT Street Maintenance responds to 95% of reported sidewalk safety concerns within two (2) business days.



Sidewalk Curb Ramp

Because needs greatly outstrip the available funds, only select sidewalks can be considered for permanent repair. Permanent repair requests are evaluated and prioritized using the following criteria:

- ✓ **Street Classification:** Arterial Streets and Bus Routes. Arterial streets carry the highest volume of traffic at the highest speeds, therefore, maintaining a walkway separated from vehicle traffic along arterial streets in passable condition is a high priority. Sidewalks located along or near bus routes provide access to transit for pedestrians.
- ✓ **User Population:** Schools, Hospitals, and Elderly Care Facilities. Youth, seniors, and citizens with mobility limitations are particularly sensitive to walkway conditions.

- ✓ Land Use, Planning and Pedestrian Generators. Urban Villages are a key component of the city's land use strategy as defined in the Seattle Comprehensive Plan. Urban Villages are intended as pedestrian-friendly areas that provide citizens access to transit, businesses and other services. Pedestrian-Designated (P) Zone designations are applied to Neighborhood Commercial (NC)

zones along pedestrian-oriented commercial streets. These areas typically have high levels of pedestrian traffic and land use regulations that promote walking. The Central Business District (CBD) has the highest level of pedestrian traffic and is Seattle's main transportation hub. Other pedestrian generators include community centers, libraries and parks, and other government offices.



Sidewalk in Residential Area

- ✓ SDOT Liability. Sidewalk damage adjacent to city property or caused by city-maintained trees represents an increased liability for SDOT. Repairing damage in these areas is also important.
- ✓ Repair Cost. SDOT seeks to deliver the greatest area of improved sidewalk to the largest number of users. Moreover, public and private partnerships allow SDOT to leverage its limited sidewalk repair budget. Cost factors accordingly in prioritizing sidewalk repair needs.

Sidewalks may also be repaired in coordination with large capital projects as part of SDOT's commitment to Complete Streets principles as expressed and adopted in Resolution 30915 and Ordinance 122386. Information on sidewalk damage associated with private property is referred to the Street Use group in the Street Use and Urban Forestry Division for action. Vegetation overgrowth from private property that impacts the sidewalk is typically referred to the Department of Planning & Development (DPD) for action, although Street Maintenance crews may abate immediate concerns.

BTG funding has provided the ability to administer a modest, permanent sidewalk repair program that allows rehabilitation of approximately 12-16 block equivalents (2,000 square feet = 1 block equivalent) of sidewalk annually. Interim spot repairs (shims) on 100-300 block equivalents are extending the reach of SDOT's sidewalk repair efforts.

Current Performance Measures:

SDOT has established the following performance measures for sidewalks:

Performance Measure	2009 ACTUAL	2010 Goal
New sidewalks built	25 .8block equivalents	15 block equivalents
Sidewalks repaired	23.24 block equivalents	22 block equivalents (45,000 sq ft)

Funding Requirements:

Maintenance and Operations:

The 2010 Street Maintenance budget for sidewalk repair is \$2.0 million. Approximately \$100,000 of this total maintenance funding is for spot repair (shims) The remaining \$1.36 million will be used for permanent repair which will fund repair of less than 0.1% of the total sidewalk system.

Where full condition information is not be available, based on the 50-year life cycle of sidewalks, an estimated 2% of the sidewalk system, including curbs, filler, and curb ramps, should be permanently repaired or replaced annually. This will require \$53 million each year.

New Construction of Sidewalks:

BTG has also provided approximately \$1.07 million for construction of new sidewalks. This amount should be adequate to meet the BTG performance measure of new sidewalk construction.

New sidewalks constructed by SDOT, developers and capital projects will require additional costs for maintenance and operations which is estimated at \$5,700 per year. While initially a modest amount, it is a compounded cost for each and every year and must be factored into the cost of routine maintenance and operations.

Results from the sidewalk inventory project show that more than 12,000 block equivalents within the city lack sidewalks. Ensuring that a sidewalk exists on each of those blocks will require an investment of more than \$2.0 billion and at current rates take 800 years to complete. More aggressive funding could complete this construction in approximately fifty (50) years given a total of \$50 million per year.



Newly Constructed Sidewalk on The Ave

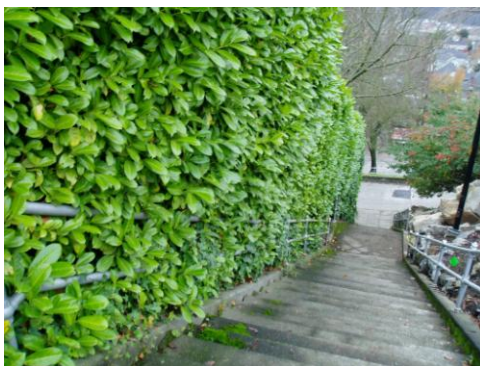
Stairways:



Due to the many hills throughout Seattle, there are numerous locations where it becomes too steep for a street or sidewalk. Stairways were built to maintain the connection between adjacent neighborhoods and to provide an interconnected network of sidewalks. Stairways encourage walking and provide access to public transportation.

Stairways are maintained by the Roadway Structures group in the Capital Projects and Roadway Structures Division.

Current Inventory and Anticipated Annual Growth:



**One of the Many Stairways
in Seattle**

The inventory of stairways has been maintained in the Structures database since 1994. The last physical inventory effort took place in the 1980s.

SDOT owns and maintains 482 stairways in the City of Seattle, or approximately 34,775 linear feet.

The estimated replacement value of stairways is \$37.3 million in current dollars.

Condition Ratings:

SDOT conducts periodic inspections of stairways including emergency response to an incident or customer request. Additional funding is needed to establish a regular, 7-year cycle of inspections.

Stairway Condition Rating (Estimated)

Good Condition	Fair Condition	Poor Condition
48%	30%	22%

This condition rating is based on an assessment conducted ten (10) years ago and has been updated by field inspection of specific stairways. Condition information is recorded in the Structures system.

Useful Life and Life Cycle Costs:

A new stairway constructed to the city of Seattle Standard has an expected useful life of 75 years, and costs approximately \$1,000 per linear foot. Routine maintenance over the life of a stairway is expected to cost approximately \$750 per linear foot.

A stairway in fair condition has a life expectancy of 15-39 years. Rehabilitation of a stairway in this condition costs \$10,000-\$50,000.

A stairway that degrades to poor condition has a life expectancy of less than fifteen (15) years and is identified for replacement. Disposal of a stairway costs \$5,000-\$50,000.

The replacement cost for a stairway is expected to be approximately \$9,200 per linear foot (2007 inflated dollars) at the end of its useful life.

Maintenance Approach:

Stairways are repaired on a priority basis within the available funding according to the criteria in the following table.

Stairway Maintenance Priority

Priority	Priority Class	Maintenance Response
1.0	Emergency	Condition warrants immediate attention
1.5	ASAP	Condition warrants attention; add to 30-day work plan
2.0	Urgent	Maintenance should be scheduled in the work plan for attention in the next three (3) months
2.5	High	Maintenance should be scheduled in the work plan for attention in the next six (6) months
3.0	Attention	Schedule the maintenance work within next 1-3 years
3.5	Note	Schedule as priority long-term maintenance
4.0	Routine	Schedule as routine long-term maintenance
5.0	Monitor	Monitor the condition of the deficiency

Safety-related complaints are inspected within 48 hours of notification 95% of the time.

Current Performance Measures:

Performance Measure	2009 Actual	2010 Goal
Stairways rehabilitated	4	3-5

Funding Requirements and Unmet Funding Needs:

The 2010 Roadway Structures budget for stairway maintenance is \$900,000. This budget is allocated for response based maintenance according to the priorities above, and for rehabilitation of three to five stairways from poor to good condition. Given the estimated 100 stairways in poor condition, it would take 20-35 years to rehabilitate all poor stairways. Roadway structures estimates approximately \$1000/linear foot to rehabilitate a stairway. At this cost, and at an average of 75 linear feet per stairway, a onetime cost to rehabilitate all poor condition stairways is \$7.5 million. If an average of ten (10) stairways were to be planned for rehabilitation each year, an allocation of \$750,000/year is required and the poor stairways could be eliminated in ten years.. This funding amount was calculated using averages, and individual stairway jobs in any one year will vary. However, at some point the total linear feet of stairway in fair or poor condition will need to be rehabilitated, and this funding requirement represents an average amount of annual funding that must be sustained over a series of years to accomplish the rehabilitation.

Because the rate of deterioration of aging stairways exceeds the rate of rehabilitation (six stairways of average length per year), the backlog of stairways rated in poor condition will persist. Roadway Structures engineers estimate that 5% of the stairways rated as fair condition will deteriorate to poor condition each year, and that 3% will deteriorate from good to fair condition in that same time period.

If a program were established to raise to good condition all of the stairways rated in fair or poor condition, a one-time cost of \$19.0 million would be required.

Trails:



Trails are off-road paths, the majority of which are paved. All of the city trails are multi-use. Multi-use trails encourage walking and biking, as well as other forms of recreational transportation, such as rollerblading. These trails provide important connections to the sidewalk network and to the region.



Portion of the Urban Trails

Trails are maintained primarily by the Street Maintenance Division at the direction of the Traffic Operations group in the Traffic Management Division. Traffic Maintenance crews also perform minor trail maintenance.

Current Inventory and Anticipated Annual Growth:

There are 39.4 lane miles of 12-foot-wide trails in the city of Seattle.

The majority of the trail inventory (32.31 miles) is recorded in the Hansen system and consists of 136 separate trail segments.

SDOT had completed the trail segments listed below, and expects to complete one additional trail segment in 2010.

- Chief Sealth Trail in 2007 (3.6 miles)
- BGT Golden Gardens to 60th Ave NW (plus 3 small projects) in 2008 (1.32 miles)
- 2 small trail connector projects in 2009 (0.3 miles).

The estimated replacement value of trails is \$78,800,000 in 2007 dollars.

Useful Life and Life Cycle Costs:

A new trail costs approximately \$2 million per lane mile to construct, and this figure does not include the construction of other structures, such as bridges or retaining walls, that could be necessary. A newly constructed gravel trail has an expected useful life of ten (10) years, and an asphalt trail is expected to last for twenty (20) years. Maintenance costs over the useful life have averaged \$1,000/mile, which only addresses spot pavement repair. Estimates of the costs of major maintenance are not available.

Maintenance Approach:

Prior to BTG funding, maintenance was undertaken in response to customer request. BTG has allowed Traffic Operations to develop a regular maintenance program for trails that includes:

- ✓ Spot repair of pavement
- ✓ Spot repair of drainage
- ✓ Sign and marking maintenance
- ✓ Mowing, trimming, and sweeping
- ✓ Emergency landslide repair

Current Performance Measures:

BTG funding has established the following performance measures for trails:

Performance Measure	2009 ACTUAL	2010 Goal
Number of urban trail and bikeway spot improvements	47	46
Number of bike trail segments built	2	1
Miles of trails inspected	20	20

The Bike Master Plan has established an additional performance measure for trails:

- ✓ Build 18.8 miles of new mixed-use trails by 2017.

SDOT has built 5.2 miles of new trails since 2007.

Funding Requirements and Unmet Funding Needs:

Maintenance and Operations:

Prior to BTG, trail maintenance was not funded separately, and spot repair was completed as part of the overall budget to maintain pavement. BTG has provided \$489,000 annually to perform routine maintenance and major rehabilitation of the trail network.

Transit Loading Platforms:

Transit loading platforms are paved areas between the sidewalk and the curb that are designated for transit passenger loading. There are two (2) categories of transit loading platforms:

- ✓ Bus bulbs, platforms and islands
- ✓ Streetcar Platforms

Bus Bulbs, Platforms and Islands:

A bus island is a paved area between the sidewalk and the curb or within the street that is designated for bus passenger waiting and loading, and may also allow the buses to stop in lane. At locations without sidewalks, the bus island is a free-standing paved area usually with asphalt entrance ramps.

These assets encourage the use of public transit by providing a designated area for bus passenger loading and unloading, and by allowing more efficient transit operations.

Bus bulbs, platforms and islands are the maintenance responsibility of the Street Maintenance Division at the direction of the Traffic Operations group in the Traffic Management Division.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

Since bus islands are new assets, very little maintenance has been required, and, hence, limited information has been recorded and tracked. An inventory of the bus islands has not been recorded, nor have bus islands been inspected to assess condition. However, as new assets, the condition of the bus islands is considered as good.

The estimated replacement value of bus islands has not been determined.

Useful Life and Life Cycle Costs:

The installation of a new bus island is estimated to cost \$5,000-\$10,000 (current dollars), and has an expected useful life of 20-40 years. Since limited maintenance has been performed on these assets, life cycle costs are not available.

Maintenance Approach:

Maintenance of bus islands is undertaken in response to a customer request.

A maintenance program has not yet been developed for bus islands.

Current Performance Measures:

Performance measures have not been developed for bus islands.

Funding Requirements and Unmet Funding Needs:

Funding requirements have not yet been established for bus islands.

Streetcar Platform:

A streetcar platform is a designated raised area of the sidewalk that houses a streetcar shelter. These are new assets that are associated with the Seattle Streetcar asset. SDOT has maintenance responsibility for streetcar platforms.

Additional information was not pursued about this asset for this reporting period.